



OLIGOCHAETA AND POLYCHAETA FAUNA OF THE CROATIAN PART OF THE SAVA RIVER

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In the article the authors present an overview of the freshwater Oligochaeta and Polychaeta of the Croatian part of the Sava River from the Slovenian state border (i.e. Drenje) to the Serbian state border (i.e. Račinovci). The overview is based on available published data as well as on authors' unpublished data collected since 1980. In the Croatian part of the Sava River, which is 562 km long (the total length is 940 km), 22 locations were analyzed. In total 43 species were found, out of which 39 belong to Oligochaeta and 4 belong to Polychaeta. The representatives of the Enchytraeidae family have not been determined down to the species level, and they are not included in the list. In this section of the Sava River the following six species have been found for the first time: *Uncinais uncinata* (Ørsted, 1842) – recorded at the 14th location; *Propappus volki* (Michaelsen, 1916) – recorded at the 19th and 21st locations; *Aulodrilus plurisetatus* (Piguet, 1906) – recorded at the 16th location; *Branchiura sowerbyi* (Beddard, 1892) – recorded at the 12th, 15th, 21st and 22nd locations; *Psammoryctides moravicus* (Hrabě, 1934) – recorded at the 4th, 14th, 15th, 16th, 19th and 20th locations; *Rhynchelmis limosella* (Hoffmeister, 1843) – recorded at the 4th location.

Key words: Oligochaeta, Polychaeta, distribution, Sava River

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U ovom radu daje se pregled faune slatkovodnih Oligochaeta i Polychaeta hrvatskog dijela rijeke Save od granice sa Slovenijom (Drenje) do granice sa Srbijom (Račinovci), temeljem dostupnih objavljenih podataka te vlastitih neobjavljenih podataka prikupljenih u razdoblju od 1980. do danas. Na hrvatskom dijelu toka rijeke Save, na koji otpada 562 km od ukupno 940 km toka, analizirane su 22 lokacije te je utvrđena prisutnost 43 vrste, od kojih njih 39 pripada skupini Oligochaeta, a 4 skupini Polychaeta. Predstavnici porodice Enchytraeidae nisu determinirani do razine vrste te nisu uvrštene u ovaj popis. Za ovaj dio toka rijeke Save prvi puta je zabilježeno šest vrsta Oligochaeta: *Uncinais uncinata* (Ørsted, 1842) je zabilježena na lokaciji 14, *Propappus volki* Michaelsen, 1916 zabilježena je na lokacijama 19 i 21, *Aulodrilus plurisetatus* (Piguet, 1906) na lokaciji 16, *Branchiura sowerbyi* Beddard, 1892 je zabilježena na lokacijama 12, 15, 21 i 22, *Psammoryctides moravicus* (Hrabě, 1934) na lokacijama 4, 14, 15, 16, 19 i 20, *Rhynchelmis limosella* Hoffmeister, 1843 je zabilježena na lokaciji 4. U radu su prikazane utvrđene značajne razlike u broju vrsta na pojedinom tipu staništa te na pojedinim istraživanim lokacijama.

Gljučne riječi: Oligochaeta, Polychaeta, rasprostranjenost, Rijeka Sava

INTRODUCTION

The Sava River is, in terms of volume of water, the largest (average discharge 1.564 m³/s), in terms of the size of the catchment, the second largest (97,713 km²), and in terms

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of length of course (946 km), the third largest tributary of the Danube River. The river basin is shared by four countries: Slovenia (11%), Croatia (26%), Bosnia and Herzegovina (40%) and Serbia (15.4%). Also, certain parts of the basin extend into the territory of Montenegro (7.5%) and Albania (0.1%) (SRBMP, 2011). The Sava River is Croatia's longest river, for 562 km of its course are in Croatian territory.

The Sava River is of exceptional significance for the entire Danube Basin due to its outstanding biological and landscape diversity. Its catchment area contains the largest complex of river wetlands of the Danube Basin (Lonjsko polje – central part of the Sava Basin) and the large lowland forest complex (Spačva). This is a unique example of a river with still intact floodplain lowlands that also plays a very significant role in mitigating flooding.

Despite the significance of this large river, relatively few, particularly recent systematic surveys have been conducted of the macrozoobenthos inclusion Oligochaeta and Polychaeta of the Croatian part of the Sava River (KEROVEC, 1979, 1981, 1985a,b; KEROVEC & MEŠTROV, 1979; KEROVEC *et al.*, 1994; MATONIČKIN *et al.*, 1975; MEŠTROV & KEROVEC, 1983; PAUNOVIĆ *et al.*, 2012). Very comprehensive surveys of the colonisation dynamics of macroscopic invertebrates on artificial surfaces resulted in records of the presence of a large number of Oligochaeta and Polychaeta in the Sava River (CAPUT *et al.*, 1996; KEROVEC, 1989; KEROVEC *et al.*, 1996; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998).

This paper gives an overview of the Oligochaeta and Polychaeta fauna of the Croatian part of the Sava River, from the border with Slovenia (Drenje) to the border with Serbia (Račinovci).

STUDY AREA

The Sava River in the territory of Croatia belongs to its middle and lower courses, which are marked by a relatively low gradient (Sava Drenje –130 m; Sava Račinovci – 80 m). The water regime of the Sava River in Croatia is largely dependent on the quantity of precipitation in its spring area (Karavanke and Julian Alps), and in the basin areas of tributaries flowing from the Dinarid mountain range. It is from the latter area that large quantities of water are brought by its large right tributaries: the rivers Kupa, Una, Vrbas, Bosna and Drina. The spring maximum flows are the result of the sudden melting of snow in the Alps and the Dinarids, the summer high water levels are the consequence of increased late spring and summer rainy periods, and the autumn high waters are the result of rains primarily in the Dinarid region. This results in large annual fluctuations in flow in the investigated part of the Sava River. The average flow of the Sava totals 276 m³/s at Drenje (Station 1) and 1.134 m³/s at Županja (Station 20). There are also significant differences in the minimum flows, 41 m³/s at Drenje and 226 m³/s at Županja. However, the recorded maximum flows at these two stations are not significantly different, 3.792 and 4.130 m³/s respectively (ŠEGOTA & FILIPČIĆ, 2007).

There are no dams on the Sava River in the investigated section that could hinder fish migration. There are only several thresholds in the Zagreb area. However, there are 6 hydroelectric plants on the river in the territory of Slovenia, with another 3 plants under construction and planned for operation by 2015 (SRBMP, 2011). These facilities could have a significant impact on the hydrological and sediment regime of the Sava River in Croatia especially in the upstream stretch.

MATERIAL AND METHODS

This overview of the Oligochaeta and Polychaeta fauna in this part of the Sava River is based on the available published data and on the unpublished data of the authors collected since 1980. The data encompass 22 stations situated along the entire Croatian stretch of the Sava River (Fig. 1, Tab. 1). Sampling locations are shown as points in the Gauss-Kruger (Gauß-Krüger) coordinate system, zone 16°30'. Coordinates are expressed in meters

Oligochaeta and Polychaeta were collected in the benthal at all stations, while at stations 1, 2, 6, 7, 8, 9, 10 and 11 periphyton and seston were also taken into consideration. In addition, a very comprehensive one-year study of the colonisation dynamics of

Tab. 1. Sampling sites along the Sava River

Location code	Sampling localities	Geographic coordinates		Type of habitat	Number of species
		x	y		
1	Sava, Drenje/Jesenice	2437315	5079027	B, P, AS, S	30
2	Sava, Zagreb Podsused	2448403	5073737	B, P, S	16
3	Sava, Zagreb Jankomir	2449823	5071412	B	11
4	Sava, Zagreb Opatovina	2452712	5070476	B	14
5	Sava, Rugvica	2479090	5065373	B	5
6	Sava, Oborovo	2480718	5059203	B, P, S	24
7	Sava, Prevlaka	2482839	5057311	B, P, S	14
8	Sava, Dubrovčak	2487604	5054837	B, P, S	17
9	Sava, Tišina	2490597	5041281	B, P, S	22
10	Sava, Galdovo	2491679	5036634	B, P, S	19
11	Sava, Sisak	2493852	5032393	B, P, S	23
12	Sava, Sunja	2510207	5026557	B	1
13	Sava, downstream Trebež	2521913	5021372	B	4
14	Sava, Jasenovac	2531363	5012273	B	6
15	Sava, Stara Gradiška	2557991	4999495	B	14
16	Sava, Davor	2580610	4995541	B	10
17	Sava, Slavonski Kobaš	2597905	4994415	B	4
18	Sava, Slavonski Brod	2612548	4995422	B	9
19	Sava, Slavonski Šamac	2658203	4991369	B	16
20	Sava, Županja	2671201	4995979	B	11
21	Sava, Gunja	2683360	4971791	B	4
22	Sava, Račinovci	2694870	4969249	B	4

Type of habitat: B = benthal, P = periphyton, S = seston, AS = artificial substrate

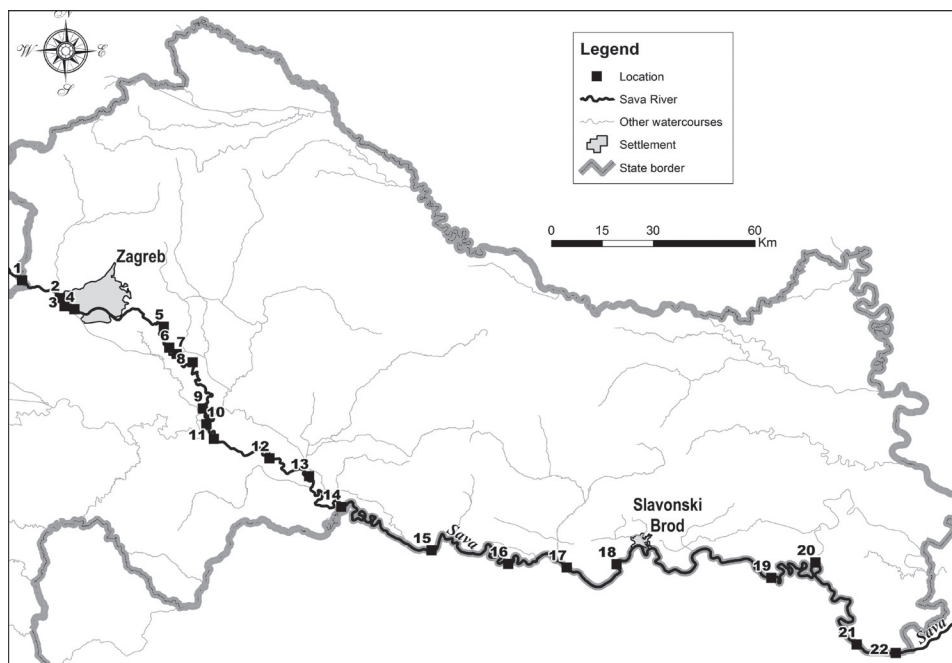


Fig. 1. Sampling sites along the Sava River (the name of the localities and geographic coordinates see on Tab. 1)

macroscopic invertebrates on an artificial substrate was conducted during two-week periods (in 1983/4 and 1992) at station 1 (Drenje).

During the last decade significant changes have occurred in the traditional classification of Clitellata based on morphological and molecular characters (ERSEUS *et al.*, 2008; WETZEL *et al.*, 2013). Having in mind that some changes in classification are still under discussion (ICZN. 2007), we followed T. TIMM's classification (2009).

RESULTS

Based on the analysis of all the available literature data and the authors' own unpublished data, in total there are 43 species of Oligochaeta and Polychaeta within the investigated stretch of the Sava River (Tab. 2). The most common family, with 19 species, was Naididae. The family Tubificidae was represented with 10 species, the families Aeolosomatidae and Pristinidae with 4 species each, the family Lumbriculidae with 3 species. The families Propatidae, Haplotaxidae and Lumbricidae were represented with a single species each. Specimens belonging to the family Enchytraeidae were recorded at all sampling sites, however, they are not included in the current list since we were not able to identify them to the species level. Appendix 1 lists all the literature and new records of these Oligochaeta and Polychaeta species at investigated stations. Appendix 1 contains data about the time of the survey (month and year), as well as the type of habitat in which the species was found: benthal (B), periphyton (P), seston (S) and artificial substrate (AS). Out of the confirmed species, six were recorded for the first time in this section of the Sava River: *Uncinais uncinata* (Ørsted, 1842) at Station 14, *Propappus*

volki Michaelsen 1916, at Stations 19 and 21, *Aulodrilus pluriset*a (Piguet, 1906) at Station 16, *Branchiura sowerbyi* Beddard, 1892 at Stations 12, 15, 21 and 22, *Psammoryctides moravicus* (Hraběr, 1934) at Stations 4, 14, 15, 16, 19 and 20, *Rhynchelmis limosella* Hoffmeister, 1843 at Station 4.

With regard to habitat types, the majority of species, 36 in total, were found in benthos, and out of these, 11 species were registered only in this habitat type. A total of 21 species were found in periphyton, and all these species were also recorded in other habitat types. The fewest species were found in seston, and only the species *Aeolosoma headleyi* Beddard, 1888 was not found in other habitat types. During the study of colonisation on artificial substrates, a total of 23 species were recorded, and of these 5 were not found in the natural habitats of this part of the river: *Aeolosoma hemprichi* Ehrenberg, 1828, *A. travancorense* Aiyer, 1926, *A. variegatum* Vejdovský, 1886, *Chaetogaster cristallinus* Vejdovský, 1884 and *Dero obtusa* Udekem, 1855.

Significant differences in the number of species found at individual stations is mainly the consequence of the differences in surveying intensity and dynamics. The largest number of species, 30, was confirmed at Station 1 (Drenje/Jesenice), and only one species was found at Station 12 (Sunja). At the remaining stations, a total 4 to 23 of were established (Fig. 2).

DISCUSSION

The representatives of freshwater Annelida described in the article belong to the classes Clitellata and Polychaeta. All representatives of Clitellata belong to the subclass Oligochaeta which is represented by the following families: Naididae, Pristinidae, Tubificidae, Propapidae, Haplotaxidae, Lumbriculidae and Lumbricidae. Only the family Aeolosomatidae (the taxonomic status of which has not yet been worked out) belongs to the class Polychaeta. BRINKHURST & JAMIESON (1971) excluded this family from the class Clitellata. They considered it an intermediate or primitive group of Oligochaeta. Today it is usually accepted that this family belongs to the order Aphanoneura within the class Polychaeta (TIMM, 2009).

The presence of 43 species of Oligochaeta and Polychaeta was confirmed in the Croatian section of the Sava River. However, this number cannot be considered final, and further research is expected to record additional species. This is also supported by the macrozoobenthos survey of the Sava River in the sections in Croatia and Serbia by PAU-

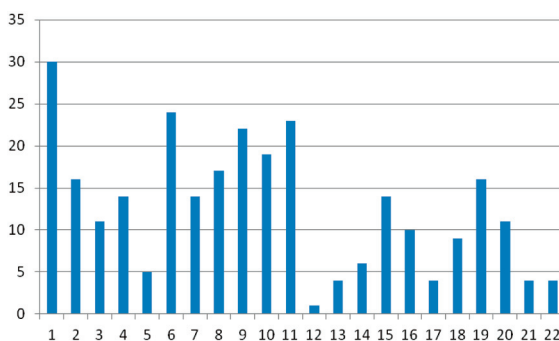


Fig. 2. The number of recorded species per locality (the name of the localities see Tab. 1)

Tab. 2. Oligochaeta and Polychaeta taxa recorded in different types of habitat

	Taxons	Type of habitat	B	P	AS	S
	OLIGOCHAETA					
	NAIDIDAE					
1	<i>Chaetogaster cristallinus</i>	Vejdovský, 1884			X	
2	<i>Chaetogaster diaphanus</i>	(Gruithuisen, 1828)	X	X	X	X
3	<i>Chaetogaster diastrophus</i>	(Gruithuisen, 1828)	X	X	X	
4	<i>Chaetogaster langi</i>	Bretscher, 1896	X	X	X	X
5	<i>Chaetogaster setosus</i>	Svetlov, 1925		X	X	
6	<i>Dero obtusa</i>	Udekem, 1855			X	
7	<i>Homochaeta naidina</i>	Bretscher, 1896	X			X
8	<i>Nais barbata</i>	Müller, 1774	X	X	X	X
9	<i>Nais behningi</i>	Michaelsen, 1923	X	X	X	
10	<i>Nais bretscheri</i>	Michaelsen, 1899	X	X	X	X
11	<i>Nais communis</i>	Piquet, 1906	X	X	X	X
12	<i>Nais elinguis</i>	Müller, 1774	X	X	X	X
13	<i>Nais pardalis</i>	Piquet, 1906	X	X	X	X
14	<i>Nais pseudobtusa</i>	Piquet, 1906	X		X	
15	<i>Nais simplex</i>	Piquet, 1906	X		X	
16	<i>Nais variabilis</i>	Piquet, 1906	X	X	X	X
17	<i>Ophidonais serpentina</i>	(Müller, 1774)	X			X
18	<i>Stylaria lacustris</i>	(Linnaeus, 1767)	X	X	X	X
19	<i>Uncinaiis uncinata</i>	(Ørsted, 1842)	X			
	PRISTINIDAE					
20	<i>Pristina aequiseta</i>	Bourne, 1891	X			
21	<i>Pristina bilobata</i>	(Bretscher, 1903)	X	X	X	X
22	<i>Pristina foreli</i>	(Piquet, 1906)	X		X	
23	<i>Pristina rosea</i>	(Piquet, 1906)	X	X	X	X
	TUBIFICIDAE					
24	<i>Aulodrilus pluriseta</i>	(Piquet, 1906)	X			
25	<i>Branchiura sowerbyi</i>	Beddard, 1892	X			
26	<i>Limnodrilus hoffmeisteri</i>	Claparède, 1862	X	X		X
27	<i>Limnodrilus udekemianus</i>	Claparède, 1862	X	X		
28	<i>Potamothrix hammoniensis</i>	(Michaelsen, 1901)	X			
29	<i>Psammoryctides albicola</i>	(Michaelsen, 1901)	X	X		
30	<i>Psammoryctides barbatus</i>	(Grube, 1861)	X	X		
31	<i>Psammoryctides moravicus</i>	(Hrabě, 1934)	X			
32	<i>Tubifex ignotus</i>	(Štolc, 1886)	X			

33	<i>Tubifex tubifex</i> (Müller, 1774)	X	X		X
	LUMBRICULIDAE				
34	<i>Lumbriculus variegatus</i> (Müller, 1774)	X	X	X	X
35	<i>Rhynchelmis limosella</i> Hoffmeister, 1843	X			
36	<i>Stylodrilus heringianus</i> Claparède, 1862	X	X		
	PROPAPPIDAE				
37	<i>Propappus volki</i> Michaelsen, 1916	X			
	HAPLOTAXIDAE				
38	<i>Haplotaxis gordioides</i> (Hartmann, 1821)	X			
	LUMBRICIDAE				
39	<i>Eiseniella tetraedra</i> (Savigny, 1826)	X			
	POLYCHAETA				
	AEOLOSOMATIDAE				
40	<i>Aeolosoma headleyi</i> Beddard, 1888				X
41	<i>Aeolosoma hemprichi</i> Ehrenberg, 1828			X	
42	<i>Aeolosoma travancorense</i> Aiyer, 1926			X	
43	<i>Aeolosoma variegatum</i> Vejdovský, 1886			X	
		36	21	23	17

Type of habitat: B = benthal, P = periphyton, S = seston, AS = artificial substrate

nović *et al.* (2012), who recorded 13 species of Oligochaeta, of which the species *Isochaetides michaelsoni* Lastockin, 1936 and *Limnodrilus claparedeanus* Ratzel, 1868 were not previously known to inhabit the Croatian section of the Sava River. However, the paper does not list the locations where the individual species were found and therefore, it cannot be confirmed that these species inhabit the sections of the Sava River included in this paper.

The largest species richness was recorded at Station 1 (Drenje/Jesenice), which is the consequence of the very comprehensive colonisation dynamic studies of macroscopic invertebrates on artificial substrates conducted here during two periods (1983/4 and 1992) (CAPUT *et al.*, 1996; KEROVEC, 1989; KEROVEC *et al.*, 1996; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998), and intensive research of natural habitats (KEROVEC, 1981, 1985a,b; KEROVEC & MEŠTROV, 1979; MEŠTROV & KEROVEC, 1983). The increasingly intensive research of the sections of the Sava River from the border with Slovenia (Station 1), and downstream of Zagreb to the confluence with the Kupa River (Stations 6–11) in the 1970s and 1980s resulted in a higher number of Oligochaeta and Polychaeta species being recorded. On the other hand, the downstream areas have been poorly studied, and for certain stations, the only known data are from MATONIČKIN *et al.* (1975). The remaining data originate from sporadic research by the authors, primarily collected during the years 2004, 2006, 2007 and 2009.

The investigated sections of the Sava River are under pronounced anthropogenic effects. This section of the Sava River drains more than 70% of the catchment area, and also has a population of more than 5 million people. This is also an area of pronounced agricultural production, which alongside the hydroelectric plants in the upper course,

also has a very strong impact on the river's ecological status (SRBMP, 2011). It is necessary to stress that oligochaetes, alongside representatives of other groups of macroscopic invertebrates, are exceptionally good indicators of both organic and other types of pollution (HELLAWELL, 1986; JOHNSON *et al.* 1993), which certainly indicates the need for further research of this group of invertebrates.

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SAŽETAK

Fauna Oligochaeta i Polychaeta hrvatskog dijela rijeke Save

M. Kerovec & Ma. Kerovec

Rijeka Sava je jedna od najvećih pritoka Dunava, a njeno slivno područje obilježava iznimna biološka i krajobrazna raznolikost. Usprkos ovim činjenicama, relativno je malo sistematskih istraživanja makrozoobentosa (osobito novijih), uključujući i Oligochaeta i Polychaeta hrvatskog dijela rijeke Save

U ovom radu daje se pregled faune Oligochaeta i Polychaeta hrvatskog dijela rijeke Save od granice sa Slovenijom (Drenje) do granice sa Srbijom (Račinovci) temeljen na dostupnim objavljenim podacima te vlastitim neobjavljenim podacima prikupljenim u razdoblju od 1980. godine do danas. Rezultatima su obuhvaćene 22 lokacije raspoređene duž cijelog hrvatskog dijela rijeke Save (Sl. 1, Tab. 1). Na svim su lokacijama Oligochaeta i Polychaeta prikupljeni u bentalu, dok su na postajama 1, 2, 6, 7, 8, 9, 10 i 11 analizirani još i uzorci obraštaja i sestona. Tijekom dva razdoblja (1983/4 i 1992) na području postaje 1 (Drenje/Jesenice) provedena su vrlo opsežna jednogodišnja istraživanja dinamike naseljavanja makroskopskih beskralješnjaka na umjetnim podlogama, što je rezultiralo evidentiranjem prisutnosti većeg broja vrsta Oligochaeta i Polychaeta u rijeci Savi.

Na hrvatskom dijelu toka rijeke Save, na koji otpada 562 km od ukupno 940 km toka, utvrđena je ukupna prisutnost 43 vrste Oligochaeta i Polychaeta (Tab. 2). Porodica Naididae je zastupljena s najviše vrsta (19). Porodica Tubificidae je zastupljena s 10 vrsta, porodica Pristinidae s 4 vrste, porodica Aeolosomatidae (Polychaeta) također s 4 vrste, a porodica Lumbriculidae s 3 vrste. Porodice Propatidae, Haplotaxidae i Lumbricidae su zastupljene samo s jednom vrstom. Predstavnici porodice Enchytraeidae nisu determinirani do razine vrste te nisu uvršteni u ovaj popis. Od utvrđenih vrsta, šest vrsta Oligochaeta je prvi puta zabilježeno u ovom dijelu toka rijeke Save: *Uncinais uncinata* (Ørsted, 1842) je zabilježena na lokaciji 14, *Propappus volki* Michaelsen, 1916 na lokacijama 19 i 21, *Aulodrilus plurisetus* (Piguet, 1906) na lokaciji 16, *Branchiura sowerbyi* Beddard, 1892 na lokacijama 12, 15, 21 i 22, *Psammoryctides moravicus* (Hrabě, 1934) na lokacijama 4, 14, 15, 16, 19 i 20, a *Rhynchelmis limosella* Hoffmeister, 1843 je zabilježena na lokaciji 4. S obzirom na različita staništa najviše je vrsta utvrđeno u bentalu, 36, od kojih 11 dolazi samo u tom tipu staništa. U obraštaju je utvrđeno 21 vrsta i sve dolaze i u drugim tipovima staništa. Najmanje vrsta, 17, utvrđeno je u sestonu, a samo vrsta *Aeolosoma headleyi* Beddard, 1888 nije utvrđeno u drugim tipovima staništa. Tijekom istraživanja naseljavanja na umjetnim podlogama (lokacija 1 – Drenje/Jesenice), utvrđene su 23 vrste, od kojih 5 nije nađeno u prirodnim staništima istraživanog dijela rijeke Save. To su *Aeolosoma hemprichi* Ehrenberg, 1828, *A. travancorensis* Aiyer, 1926, *A. variegatum* Vejdovský, 1886 (Polychaeta), *Chaetogaster cristallinus* Vejdovský, 1884 i *Dero obtusa* Udekem, 1855 (Oligochaeta). Također su utvrđene velike razlike u broju vrsta utvrđenih na pojedinim lokacijama, što je uglavnom posljedica različitog intenziteta i dinamike istraživanja. Najviše je vrsta, 30, utvrđeno na lokaciji 1 (Drenje/Jesenice), a svega jedna vrsta je utvrđena na lokaciji 12 (Sunja). Na ostalim lokacijama je utvrđeno od 4 do 23 vrste (Sl. 2).

Međutim, broj utvrđenih vrsta još nije konačan te se tijekom daljnjih istraživanja očekuju nalazi još nekoliko novih vrsta, prvenstveno u donjem dijelu toka rijeke Save koji je do sada slabije istraživao.

APPENDIX:**ALL THE LITERATURE AND THE NEW RECORDS OF OLIGOCHAETA AND POLYCHAETA SPECIES AT ALL INVESTIGATED STATIONS****Species name****Location code** (the names of the localities see in Tab. 1)**Type of habitat** (B=benthos, P=periphyton, S=seston, AS=artificial substrate)**Literature data****Present study** (date of finding/month and year)**Class CLITELLATA****Subclass OLIGOCHAETA****Order TUBIFICIDA****Family Naididae***Chaetogaster cristallinus* Vejdovský, 1884Locality: **1** (AS-KEROVEC, 1985b; KEROVEC, 1989)*Chaetogaster diaphanus* (Gruithuisen, 1828)Localities: **1** (B,P,AS,S-MEŠTROV & KEROVEC, 1983, 1981, 1985b, 1989; MIHALJEVIĆ *et al.*, 1998); **3** (B-05.2004.); **6** (P-KEROVEC, 1979, 1981); **7** (B,P-KEROVEC, 1979, 1981); **8** (B,P-KEROVEC, 1979, 1981); **9** (B,P-KEROVEC, 1979, 1981); **10** (B,P-KEROVEC, 1979, 1981); **11** (B,P-KEROVEC, 1981);*Chaetogaster diastrophus* (Gruithuisen, 1828)Localities: **1** (AS-KEROVEC, 1985b, 1989; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998); **6** (B-02.2004., 05.2004.); **15** (B-07.2004., 10.2004., 07.2007.);*Chaetogaster langi* Bretscher, 1896Localities: **1** (AS,S-KEROVEC, 1981, 1985b, 1989; MATONIČKIN *et al.*, 1975.); **2** (P-KEROVEC, 1981); **5** (B-MATONIČKIN *et al.*, 1975); **6** (P,S-KEROVEC, 1979, 1981); **7** (P,S-KEROVEC, 1979, 1981); **8** (P,S-KEROVEC, 1979, 1981); **9** (B,P,S-KEROVEC, 1979, 1981); **10** (P,S-KEROVEC, 1979, 1981); **11** (B,P,S-KEROVEC, 1981)*Chaetogaster setosus* Svetlov, 1925Locality: **1** (AS,P-KEROVEC, 1985a,b, 1989; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998)**Homochaeta naidina* Bretscher, 1896Localities: **7** (S-KEROVEC, 1979, 1981); **8** (S-KEROVEC, 1979, 1981); **9** (B,S-KEROVEC, 1979, 1981); **10** (S-KEROVEC, 1979, 1981)*Uncinais uncinata* (Ørsted, 1842)Locality: **14** (B-05.2009.)*Nais barbata* Müller, 1774Localities: **1** (B,AS-MEŠTROV & KEROVEC, 1983; KEROVEC, 1981, 1985b, 1989; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998); **2** (P-KEROVEC, 1981); **3** (B-12.2003., 05.2004., 06.2006.); **6** (P,S-KEROVEC, 1979, 1981); **7** (P-KEROVEC, 1979, 1981); **8** (P-KEROVEC, 1979, 1981); **9** (B,P,S-KEROVEC, 1979, 1981; MEŠTROV & KEROVEC, 1983); **10** (B,P-KEROVEC, 1979, 1981); **11** (B,P-KEROVEC, 1981); **15** (P-MATONIČKIN *et al.*, 1975); **16** (P-MATONIČKIN *et al.*, 1975); **18** (P-MATONIČKIN *et al.*, 1975); **19** (P-MATONIČKIN *et al.*, 1975); **20** (P-MATONIČKIN *et al.*, 1975)

Nais behningi Michaelsen, 1923

Localities: **1** (B,P,AS-MEŠTROV & KEROVEC, 1983; KEROVEC, 1985b; MIHALJEVIĆ, 1994; CAPUT *et al.*, 1996; MIHALJEVIĆ *et al.*, 1998); **2** (B-09.1980., 05.1981.); **4** (B-5.1981.); **6** (B-05.1981.); **9** (B-MEŠTROV & KEROVEC, 1983); **10** (B-05.2009.)

Nais bretscheri Michaelsen, 1899

Localities: **1** (B,AS-MEŠTROV & KEROVEC, 1983; KEROVEC, 1985a, 1989; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998); **2** (B-09.1980., 05.1981.); **3** (B-12.2003., 02.2004., 06.2006.); **6** (B,P-KEROVEC 1979; 03.1981., 12.2003., 05.2004.); **7** (P-KEROVEC, 1979); **8** (B,P-KEROVEC, 1979); **9** (B,P,S-KEROVEC, 1979; MEŠTROV & KEROVEC, 1983); **10** (B,P-KEROVEC, 1979; 05.2009.); **11** (B-KEROVEC *et al.*, 1994; 10.1976., 07.1977., 09.1977., 11.1978.); **15** (B-09.2004., 07.2007.); **16** (B-06.2007.); **19** (B-06.2007., 07.2007., 06.2008.); **20** (B-07.2006.)

Nais communis Piquet, 1906

Localities: **1** (B,AS-KEROVEC, 1979; MEŠTROV & KEROVEC, 1983; KEROVEC, 1985a, 1989; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998; 05.2009.); **3** (B-06.2006.); **6** (P,S-KEROVEC, 1979, 1981); **7** (B,P,S-KEROVEC, 1979); **8** (B,P-KEROVEC, 1981); **9** (P,S-KEROVEC, 1979, 1981); **10** (B,P-MATONIČKIN *et al.*, 1975; KEROVEC, 1979, 1981); **11** (B-KEROVEC, 1981); **16** (B-MATONIČKIN *et al.*, 1975; 09.2006., 06.2007.); **18** (B-MATONIČKIN *et al.*, 1975);

Nais elinguis Müller, 1774

Localities: **1** (B,AS-KEROVEC, 1979; MEŠTROV & KEROVEC, 1983; KEROVEC, 1985b, 1989; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998; 05.2009.); **2** (B-KEROVEC 1979; 03.1981., 05.1981.); **3** (B-12.2003., 02.2004., 06.2006.); **4** (B-05.1981., 09.1980.); **6** (B,P,S-KEROVEC, 1979; MEŠTROV & KEROVEC, 1983); **8** (P,S-KEROVEC, 1979); **9** (B,P-KEROVEC, 1979; MEŠTROV & KEROVEC, 1983); **10** (B,P,S-MATONIČKIN *et al.*, 1975; KEROVEC, 1979); **11** (B-MATONIČKIN *et al.*, 1975; KEROVEC *et al.*, 1994; 10.1976., 09.1978.); **13** (B-MATONIČKIN *et al.*, 1975); **18** (B,P-MATONIČKIN *et al.*, 1975); **20** (B-MATONIČKIN *et al.*, 1975);

Nais pardalis Piquet, 1906

Localities: **1** (B,P,AS-KEROVEC, 1979, 1981, 1985b, 1989; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998); **2** (B-KEROVEC, 1979, 1981); **3** (B-12.2003.); **4** (B-09.1980.); **6** (P,S-KEROVEC, 1979, 1981); **7** (P,S-KEROVEC, 1979, 1981); **8** (B-KEROVEC, 1979, 1981); **9** (B,P,S-KEROVEC, 1979, 1981b; MEŠTROV & KEROVEC, 1983); **10** (P-KEROVEC, 1979, 1981; 05.2009.); **11** (B,P,S-KEROVEC, 1981);

Nais pseudobtusa Piquet, 1906

Localities: **1** (B,AS-MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998; 05.2004.); **2** (B-09.1980., 05.1981.); **3** (B-12.2003., 06.2006.); **5** (B-MATONIČKIN *et al.*, 1975); **6** (B-12.2003.); **11** (B-KEROVEC, 1981);

Nais simplex Piquet, 1906

Localities: **1** (AS-KEROVEC, 1985b, 1989; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998); **11** (B-KEROVEC, 1981);

Nais variabilis Piquet, 1906

Localities: **1** (B,P,AS-KEROVEC, 1979, 1981, 1985b, 1989; MIHALJEVIĆ *et al.*, 1998); **2** (S-KEROVEC, 1981); **4** (B-MATONIČKIN *et al.*, 1975); **6** (P-KEROVEC, 1981); **8** (P,S-KEROVEC, 1981); **9** (P-KEROVEC, 1979, 1981); **10** (P-KEROVEC, 1979, 1981); **11** (P,S-KEROVEC, 1981);

Ophidonais serpentina (Müller 1774)

Localities: **9** (B,S-KEROVEC, 1981; MEŠTROV & KEROVEC, 1983); **10** (B-05.2009.); **14** (B-09.2004.);

Dero obtusa Udekem, 1855

Locality: **1** (AS-KEROVEC, 1985b, 1989; MIHALJEVIĆ *et al.*, 1998)

Stylaria lacustris (Linnaeus, 1767)

Localities: **1** (B,AS-KEROVEC, 1979, 1981, 1985a, 1989; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998); **2** (B,P-KEROVEC, 1979, 1981); **3** (B-05.2004., 06.2006.); **6** (B,P-KEROVEC, 1979, 1981; MEŠTROV & KEROVEC, 1983; 05.2004.); **8** (P-KEROVEC, 1981); **9** (B,P-KEROVEC, 1979, 1981; MEŠTROV & KEROVEC, 1983); **10** (B,P-MATONIČKIN *et al.*, 1975; KEROVEC, 1979, 1981; 05.2009.); **11** (B,P-S-KEROVEC, 1981); **13** (B-MATONIČKIN *et al.*, 1975); **15** (B-MATONIČKIN *et al.*, 1975; 09.2004., 10.2007.); **17** (B-MATONIČKIN *et al.*, 1975); **18** (B-MATONIČKIN *et al.*, 1975); **20** (B-MATONIČKIN *et al.*, 1975);

Family Pristinidae*Pristina aequisetata* Bourne, 1891

Localities: **13** (B-MATONIČKIN *et al.*, 1975); **14** (B-MATONIČKIN *et al.*, 1975);

Pristina bilobata (Bretscher, 1903)

Localities: **1** (AS-MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998); **5** (B-MATONIČKIN *et al.*, 1975); **6** (S-KEROVEC, 1981); **7** (P,S-KEROVEC, 1979, 1981); **8** (S-KEROVEC, 1979); **10** (B,S-MATONIČKIN *et al.*, 1975; KEROVEC, 1979, 1981); **11** (B-KEROVEC, 1981; KEROVEC *et al.*, 1994); **13** (B-MATONIČKIN *et al.*, 1975); **15** (B-MATONIČKIN *et al.*, 1975); **16** (B-MATONIČKIN *et al.*, 1975); **17** (B-MATONIČKIN *et al.*, 1975); **18** (B-MATONIČKIN *et al.*, 1975); **19** (B-MATONIČKIN *et al.*, 1975);

Pristina foreli (Piguet, 1906)

Localities: **1** (AS-MIHALJEVIĆ, 1994; CAPUT *et al.*, 1996; MIHALJEVIĆ *et al.* 1998); **2** (B-KEROVEC, 1981); **11** (B-KEROVEC *et al.* 1994); **19** (B-06.2008.); **20** (B-07.2006.);

Pristina rosea (Piguet, 1906)

Localities: **1** (B,AS-MEŠTROV & KEROVEC, 1983; KEROVEC, 1985b, 1989; MIHALJEVIĆ, 1994; MIHALJEVIĆ *et al.*, 1998); **2** (B-KEROVEC, 1981); **4** (B-09.1980.); **7** (S-KEROVEC, 1979, 1981); **8** (S-KEROVEC, 1979, 1981); **9** (P,S-KEROVEC, 1979, 1981); **11** (B-KEROVEC, 1981; KEROVEC *et al.*, 1994);

Family Tubificidae**Subfamily Rhyacodrilinae***Branchiura sowerbyi* Beddard, 1892

Localities: **12** (B-10.2004.); **15** (B-07.2004., 10.2004., 08.2007., 10.2007.); **21** (B-10.2004., 07.2007., 08.2007., 09.2007.); **22** (B-05.2009.)

Subfamily Tubificinae*Aulodrilus plurisetata* (Piguet, 1906)

Locality: **16** (B-06.2007.);

Limnodrilus hoffmeisteri Claparède, 1862

Localities: **1** (B-KEROVEC, 1981; MEŠTROV & KEROVEC, 1983); **2** (B-KEROVEC, 1979, 1981); **3** (B-12.2003., 05.2004., 06.2006.); **4** (B-05.1981., 09.1980.); **6** (B,P-KEROVEC, 1979, 1981; MEŠTROV & KEROVEC, 1983); **7** (B,P,S-KEROVEC, 1979, 1981); **8** (B,P-KEROVEC, 1979, 1981); **9** (B,P-KEROVEC, 1979, 1981; MEŠTROV & KEROVEC, 1983); **10** (B,P-KEROVEC, 1979, 1981; 05.2009.); **11** (B,P,S-KEROVEC, 1981; KEROVEC *et al.*, 1994); **14** (B-05.2009.); **15** (B-07.2004., 08.2004., 09.2004., 10.2004., 07.2007., 08.2007., 09.2007., 10.2007.); **16** (B-09.2006., 06.2007., 07.2007., 09.2007., 05.2009.); **18** (B-08.2004., 09.2007.); **19** (B-06.2007., 07.2007., 06.2008., 05.2009.); **20** (B-07.2006.); **21** (B-08.2004., 10.2004., 07.2007., 08.2007., 09.2007., 10.2007.); **22** (B-05.2009.)

Limnodrilus udekemianus Claparède, 1862

Localities: **1** (B-KEROVEC, 1981); **2** (B-KEROVEC, 1979, 1981); **6** (B,P-KEROVEC, 1979, 1981; MEŠTROV & KEROVEC, 1983); **7** (B,P-KEROVEC, 1979, 1981); **8** (B-KEROVEC, 1979, 1981); **9** (B-KEROVEC, 1979, 1981; MEŠTROV & KEROVEC, 1983); **10** (B-KEROVEC, 1979, 1981); **11** (B-KEROVEC, 1981b; KEROVEC *et al.*, 1994); **15** (B-10.2004., 08.2007.); **21** (B-08.2007.); **22** (B-05.2009.)

Potamotheix hammoniensis (Michaelsen, 1901)

Localities: **4** (B-07.1985.); **6** (B-12.2003., 05.2004.); **11** (B-KEROVEC *et al.*, 1994)

Psammoryctides albicola (Michaelsen, 1901)

Localities: **1** (B-KEROVEC, 1981; MEŠTROV & KEROVEC, 1983); **6** (B,P-KEROVEC, 1979, 1981; MEŠTROV & KEROVEC, 1983); **9** (B-MEŠTROV & KEROVEC, 1983); **11** (P-KEROVEC, 1981); **15** (B-07.2004., 08.2004., 07.2007., 10.2007.)

Psammoryctides barbatus (Grube, 1861)

Localities: **1** (B-KEROVEC, 1981; MEŠTROV & KEROVEC, 1983); **2** (B-KEROVEC, 1979, 1981); **4** (B-09.1980., 05.1981., 07.1985.); **6** (B,P-KEROVEC, 1979, 1981; MEŠTROV & KEROVEC, 1983); **8** (P-KEROVEC, 1979, 1981); **9** (B-MEŠTROV & KEROVEC, 1983); **10** (B,P-KEROVEC, 1979, 1981; 05.2009.); **11** (B-KEROVEC, 1981; KEROVEC *et al.*, 1994); **15** (B-07.10.2004., 07.2007., 10.2007.); **16** (B-05.2009.); **18** (B-08.2004., 09.2004., 10.2007.); **19** (B-06.2007., 06.2008.); **20** (B-07.2006.); **22** (B-05.2009.)

Psammoryctides moravicus (Hrabě, 1934)

Localities: **4** (B-07.1985.); **14** (B-05.2009.); **15** (B-07.2004., 10.2004., 07.2007., 10.2007.); **16** (B-06.2007.); **19** (B-06.2008.); **20** (B-07.2006.)

Tubifex ignotus (Štolc, 1886)

Localities: **1** (B-MEŠTROV & KEROVEC, 1983); **6** (B-MEŠTROV & KEROVEC, 1983); **9** (B-MEŠTROV & KEROVEC, 1983); **19** (B-MATONIČKIN *et al.*, 1975)

Tubifex tubifex (Müller, 1774)

Localities: **1** (B,P-KEROVEC, 1981; MEŠTROV & KEROVEC, 1983); **2** (B-KEROVEC, 1979, 1981); **4** (B-05.1981., 09.1980.); **5** (B-MATONIČKIN *et al.*, 1975); **6** (B,P,S-KEROVEC, 1979, 1981; MEŠTROV & KEROVEC, 1983); **7** (B,P,S-KEROVEC, 1979, 1981); **8** (B,P,S-KEROVEC, 1979, 1981); **9** (B,P,S-KEROVEC, 1979, 1981; MEŠTROV & KEROVEC, 1983); **10** (B,P,S-MATONIČKIN *et al.*, 1975; KEROVEC, 1979, 1981); **11** (B-MATONIČKIN *et al.*, 1975; KEROVEC, 1981; KEROVEC *et al.*, 1994); **14** (B-MATONIČKIN *et al.*, 1975); **15** (B-MATONIČKIN *et al.*, 1975; 07.2004., 09.2004., 10.2004., 07.2007., 08.2007., 09.2007., 10.2007.); **17** (B-MATONIČKIN *et al.*, 1975); **18** (B-MATONIČKIN *et al.*, 1975); **19** (B-MATONIČKIN *et al.*, 1975); **20** (B-MATONIČKIN *et al.*, 1975)

Order ENCHYTRAEDIA**Family Propappidae***Propappus volki* Michaelsen, 1916

Localities: **19** (B-06.2007., 07.2007., 09.2007., 05.2009.); **21** (B-10.2004., 07.2007.)

Order HAPLOTAXIDA**Family Haplotaxidae***Haplotaxis gordioides* (Hartmann, 1821)

Locality: **11** (B-KEROVEC *et al.*, 1994)

Order LUBRICULIDA**Family Lumbriculidae**

Lumbriculus variegatus (Müller, 1774)

Localities: **1** (B,AS-KEROVEC, 1981, 1985a, 1989; MIHALJEVIĆ *et al.*, 1998); **4** (B-05.1981., 09.1980.); **5** (B-MATONIČKIN *et al.*, 1975); **6** (P-KEROVEC, 1979, 1981); **8** (P-KEROVEC, 1981); **9** (S-KEROVEC, 1979, 1981); **10** (S-KEROVEC, 1979, 1981); **11** (B-KEROVEC, 1981; KEROVEC *et al.*, 1994); **16** (B-09.2006., 06.2007.); **17** (B-MATONIČKIN *et al.*, 1975); **19** (B-MATONIČKIN *et al.*, 1975; 06.2007., 07.2007., 06.2008., 05.2009.); **20** (B-07.2006.)

Rhynchelmis limosella Hoffmeister, 1843

Locality: **4** (B-07.1985.)

Stylodrilus heringianus Claparède, 1862

Localities: **1** (B-05.2009.); **3** (B-12.2003.); **9** (P-KEROVEC 1981); **15** (B-07.2007.); **16** (B-07.2007.); **18** (B-08.2004., 10.2007.); **19** (B-06.2008.); **20** (B-07.2006.)

Order CRASSICLITELLATA**Suborder LUMBRICINA****Family Lumbricidae**

Eiseniella tetraedra (Savigny, 1826)

Localities: **2** (B-KEROVEC, 1981); **3** (B-05.2004.); **7** (B-KEROVEC, 1979, 1981; KEROVEC *et al.*, 1994), **10** (B-05.2009.); **11** (B-KEROVEC, 1981); **14** (B-05.2009.); **19** (B-05.2009.)

Class POLYCHAETA**Order APHANONEURA****Family: Aeolosomatidae**

Aeolosoma headleyi Beddard, 1888

Localities: **6** (S-KEROVEC, 1979, 1981), **7** (S-KEROVEC, 1979, 1981)

Aeolosoma hemprichi Ehrenberg, 1828

Locality: **1** (AS) (KEROVEC, 1985b, 1989)

Aeolosoma travancorensis Aiyer, 1926

Locality: **1** (AS-KEROVEC, 1985b, 1989; MIHALJEVIĆ *et al.*, 1998)

Aeolosoma variegatum Vejdovský, 1886

Locality: **1** (AS-KEROVEC, 1985b)

*TIMM & GRIMM (2005) suggested that this species is not valid. Probably erroneously described on some juvenile Tubificidae and, maybe, hind zooids of some Naididae.